Isolating and Identifying Bacteriophages:
New Course Designs that Target K-12 and Undergraduate Students

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GOALS

❖ Inspire K-12 students to follow a STEM path

❖ Educate them on bacteria, viruses & their environment

❖ Retain undergraduates in the STEM pipeline
Bacteriophages: viruses that infect bacteria
Bacteriophage Life Cycle
METHODS

Collect soil or water sample

↓

Isolate bacteriophages

↓

Purify bacteriophages

↓

Identify and characterize bacteriophage
Bacteriophages form plaques on a lawn of bacteria.
Georgia Performance Standards

Fifth Grade: students investigate scientific concepts and use hands on activities to discover and explain phenomena.

S5L4. Students will relate how microorganisms benefit or harm larger organisms.
Serial Dilutions

10^0
100 μL

10^{-1}
90 μL

10^{-2}
90 μL

10^{-3}
90 μL

A
B
C
D
Classroom Activity

• Students are given a water sample containing bacteriophages and asked to dilute the sample.

• Instructors then mix virus dilutions with bacterial cultures and plate.
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<th>Pre-test</th>
<th>Post-test</th>
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<td>1. Where is the best place to look for microorganisms?</td>
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<td>2. What makes food bad?</td>
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<td>3. In what ways can microorganisms harm people?</td>
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<td>4. What is the difference between bacteria and viruses?</td>
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<td>5. What are bacteriophages? Are they organisms?</td>
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<td>6. How can microorganisms be useful to people?</td>
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Undergraduates in the Biological & Environmental Sciences

- **Principles of Biology Laboratory**
  - Lower-level majors
  - Soil bacteriophages
  - 2-lab protocol

- **Applied Field Hydrogeology**
  - Upper-level majors
  - Water bacteriophages
Future Directions

- K-12 teacher workshops
- ‘Bacteriophages in a Box’
Acknowledgements

• Georgia College Graduate Student
  – Destaalem Tewolde

• Georgia College STEM Small Grants Program
  – Dr. Jason Huffman
  – Dr. Rosalie Richards

• Creekside Elementary
  – Dr. Dennis Drummond